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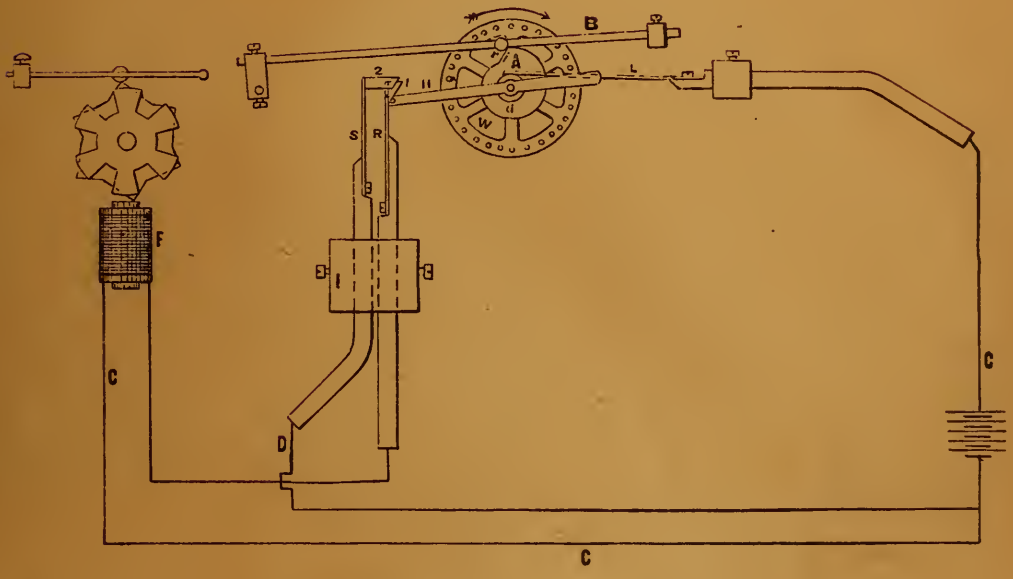
A NEW SYSTEM

OF

ELECTRIC CLOCKS



Its Principles and "Advantages"

BY

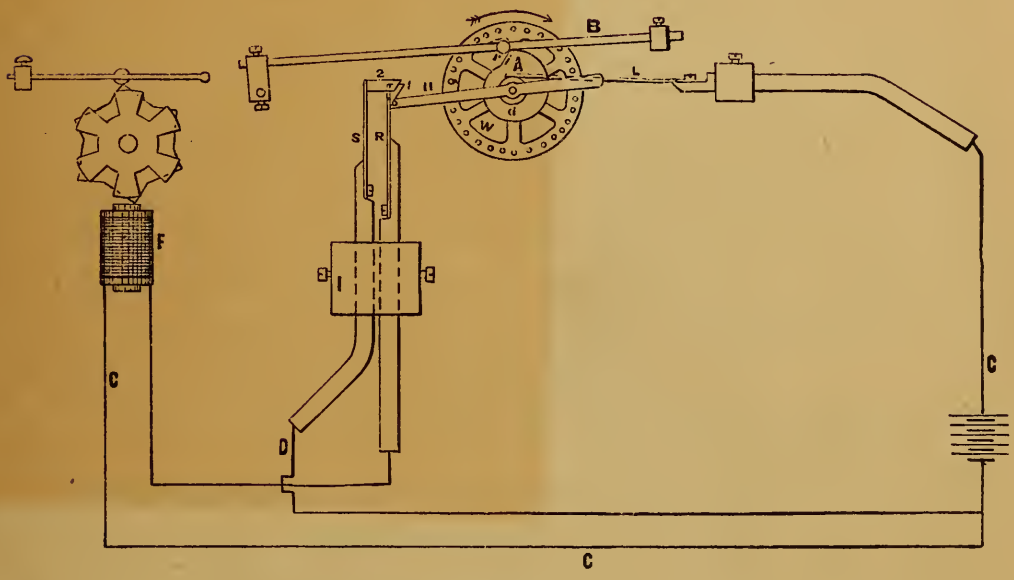
LOUIS H. SPELLIER

PHILADELPHIA

A NEW SYSTEM

OF

ELECTRIC CLOCKS



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Preface.

A few years ago, when my fundamentally new system of Time Telegraphs, new both in device and action, was first made known through the Journal of the Franklin Institute; and the various publications devoted to electrical subjects, especially those of Europe, universally opened their columns for its favorable consideration, I resolved to devote my time and labor to a further development and perfection of such arrangement in Time Telegraphy as had been heretofore either defective in device or too intricate in mechanical construction, and therefore not easily maintainable by any except a thoroughly schooled attendant.

This determination found still more encouragement when the unanimous vote of the Committee on Science and Arts, of the Franklin Institute, recommended the granting of the Elliott Cresson Gold Medal to me as "a warm approval and commendation for this very ingenious invention." And when the Board of Managers of that Institution granted to me this honor, I even felt it to be my duty to vindicate their generous action by further endeavoring to develop old or supply new means for the removal of well-known defects in the electric time service.

My electro-magnetic escapement disposed completely of the violent action of the armature and its serious consequences to the mechanism of electric clocks. Any modification of their device could only have for its object the construction of the mechanical details to the best advantage. Any experiments in this direction were therefore of a secondary consideration only.

But Time Telegraphy had weak points of a still graver character outside of those confined to the electric time indicators only.

It is the transmission of the electric energy by the standard clock to the electric dials that has offered rather perplexing difficulties.

The problem here to be solved is of a double kind. It is to avoid the spark of the induced current and its evil consequences on one hand, and on the other to make a firm and secure contact for the passage of the electric current *by the standard* clock, without resorting to any of the additional intricate mechanical attachments to the regulators selected for this purpose in other known systems.

The well-known phenomena of the spark produced by an induced current on the contact surfaces of the contact-maker at the breaking of the circuit, and its ultimate result of either oxidizing or entirely destroying this contact surface, was my next object of attention. This always has been one of the serious evils with which the successful introduction of Time Telegraphy had to contend. I have succeeded in devising a very simple arrangement which effectively meets the necessities of the case. The many republications and favorable comments by professional journals at home and abroad, assured me of the full appreciation it received at the hands of high authorities of the electrical profession.*

Of course I do not claim to have conceived the first fundamental idea of such a contrivance. But the *peculiar manner* in which I accomplished the object *is fundamentally new* and makes it applicable especially for the use of electric clocks.

To find a method to make the powers ordinarily expended by the escapement wheel of the standard clock sufficient to occasion a firm electrical contact, became the object of a long series of fruitless experiments.

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*The "Electrical World," of New York (1883), received its information on this invention from "Lumiere Electrique," of Paris. "The World," not knowing the source of the French Journal, stated the invention to be by "Mr. Spellier, of France."

As often occurs in such cases, a new idea quite dissimilar in conception to the preceding unsatisfactory experiments presented itself, and gave me the means to accomplish in less than one day what during many months of unabated labor I had vainly striven to realize.

This invention (Pat., Nov. 17, 1885) I believe, will greatly simplify Time Telegraphy by making any regulator efficient for electric time distribution.

Of late, Time Telegraphy has been conspicuously pressed into the foreground in America, and many a "new system," and its early introduction has been spoken of. In view of this, my tardiness in making any stringent efforts to personally introduce my system more generally before this time, has been made a matter of reproach to me by many of my well-meaning friends and patrons. But the following statements I think will explain and fully justify my tardy progress in that direction.

It is true the time it has taken me to invent and complete the necessary mechanical arrangements extends over a long period, but other circumstances also prevented me from prosecuting this work uninterruptedly. It is a well-known fact that the inventor is often rich in tokens of high appreciation, in medals, indorsements and other honorable distinctions, but also, as a rule, is not sufficiently endowed with means to give to his as yet undeveloped schemes the most practical form. This frequently obliges him to seek material aid from the often selfish and unscrupulous "promoter" whose life's maxim—"cheat him, for he is an inventor"—too often makes such men the real owner of the invention before its completion. To prevent such an occurrence has been another reason for my slow progress. What I have now to offer *is* a new system of Time Telegraphy, with several inventions, fundamentally new, consisting of simple and efficient arrangements, which are protected by carefully prepared patents against infringements of any kind. Since they possess, also, recognized advantages that are peculiar to them only, they offer a promising field to enterprising capitalists and energetic business talent that must readily command attention.

My inventions in the field of Electric Pendulum Clocks, I have, for the present, excluded from this pamphlet. I intend, however, to prepare a description of them for the next edition. Those interested in the subject, I refer to the different publications mentioned below.*

The various forms of my secondary electric clocks for special purposes, I also had to omit for the present, and confine myself to the general principles of my system only.

L. H. S.

*La Lumiere Electrique, Paris, Vol. 7, 523.
Journal of the Franklin Institute, August, 1882.
The Telegraphic and Electrical Review, London, Sept., 16, 1882.
Dingl. Polytechn. Journ., Augsburg, 1882.
A. Merling, Die Elektrischen Uhren, 1884, pages 67, 83, 87 to 93.

The New System of

Time Telegraphy.

Time Telegraphy has for its object the distribution of time to different localities through the medium of electricity. The chief factors of Time Telegraphy are: a well-regulated and reliable time piece, properly called the main or primary clock, also a standard clock, a voltaic battery, the electric time indicators or secondary electric clocks, the electric contact-maker, to operate the secondary dials, and the line wires, which connect electrically the parts named for proper action into a complete system.

The secondary electric clock, the electric contact-maker, and the manner in which the latter is operated by the main clock, are those parts of Time Telegraphy that have been in need of essential improvements, while on the other hand the regulator (main clock) has for years reached such a degree of perfection that skill, ingenuity or scientific attainments can add but little to its efficiency.

The secondary electric clock (also called Time Telegraph) was invented almost simultaneously by Steinheil, Wheatstone and Bain more than forty years ago, and has received in Europe for many years a favorable consideration at the hands of prominent inventors and a practical application in public service. In America the general interest taken in electric clocks is of very recent date, and therefore the knowledge and experience on the subject has not taken the definite form we find it to have with the practical electricians of Europe.

Before we take up for consideration my own inventions in Time Telegraphy I will illustrate the common principle which characterizes the Time Telegraphs generally in use, and thereby make more comprehensible the defects they have all in common, and to avoid which is the purpose of my invention.

They all depend upon the action of one armature, which either is moved by the attraction of both poles of the electro-magnet, or, as in the Stohner system, alternately attracted or repelled from one to the other pole, in which case the armature is a polarized one. I do not know of any instance where the latter system, which is in Europe the most common, has been made use of in America; while the former method, the oldest of the two, has been the leading guide to

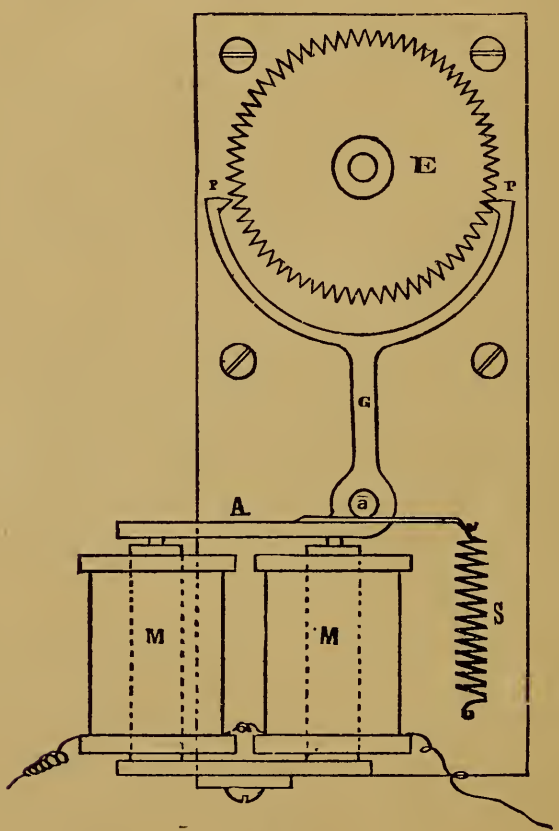

Fig. 1.

American constructors. Fig. 1 illustrates the general principle of them. It embraces the main features of one of the oldest kind of secondary electric clocks, that of Wheatstone, and is in its present rather modified form patented in the United States.

The electro-magnet M attracts the armature A. The latter is fastened to its shaft, and moves at *a*. Fastened to the armature in a right angle is the Graham anchor G, the pallets p p of this anchor fit into the teeth of the escapement wheel E.

When the electric current passes through the coil of the electro-magnet, this armature is attracted, and, as represented in the drawing, the pallet p on the rght side is pressed into the space between two teeth of the escapement wheel. As soon as the electric current is interrupted, aud the armature attracted no longer, the spring S removes the armature from the poles of the magnet, and with it moves the anchor G to the right, which then brings the pallet p on the left side of the anchor into the space between two teeth of the escapement wheel, and while doing so, it moves the wheel one tooth in the direction desired, which is determined by relative position of the pallets to the escapement wheel. This movement then causes in an appropriate manner the movements of the hands in front of a clock-dial connected with the arrangement.

Of course, *in mechanical arrangement*, the Time Telegraphs generally in use are widely differing; the leading feature, however, the action of the armature, and the transmission of its movements to the mechanism of the clock-train, have an established similarity, the repetition of which is easily traceable in all of them.

The device here presented was merely chosen as one most illustrative of the types commonly in use. It shows, in my opinion, the analogy between the many one-armature Time Telegraphs very clearly.

Experience has shown that this similarity of their mechanical arrangement, causes also a similarity of the defects of each of them, one especially was keenly felt, the more the demand for electric clocks grew. We all are familiar with the loud and sharp clattering the Morse telegraph produces when in action. Since the armature of these Time Telegraphs act in a like manner, the same noise ac-

companies its movements, only in a higher degree, since the work it has to perform requires a greater degree of force. This noise, however, might not overtax our patience, and might impress us as something not unusual if once acquainted with it, and not repeated any oftener than at intervals of one minute, but if repeated every second such clocks simply become in dwellings, offices, or other quiet places, intolerable. But that is not the only nor most serious objection.

The movement of the armature is not one of a gradual action, but is an instantaneous one. With great rapidity it flies towards the poles of the electro-magnet, and is suddenly checked in its progress when in close proximity to the poles. Only a small space is allowed to prevent it from actual contact with the poles, and therefore the magnetic attraction is nearly the greatest attainable. Clock-work must, to a certain degree, necessarily be delicate to move easily, and therefore, the violent blows resulting from this instantaneous check, or the thrust-like action by which the movement of the escapement wheel is caused, will inevitably become destructive to the mechanism. That this is the case in a high degree with electric dials that are actuated every second, any observer may have occasion to take notice of at various depots of the Pennsylvania Railroad, where such dials have been rather too frequently covered with paper, to hide them from view on account of some derangement resulting as I contend from this very evil. Nor will this result be surprising to any one taking the pains to listen to the beat of such a clock. Its clattering action reminds one more of a busy blacksmith shop, than of the tick we are accustomed to associate with the mechanical clock commonly in use. That electric dials actuated every minute only are less subject to the above-mentioned defect, is self evident, but of course the same result will become apparent in the course of time nevertheless.

It is but natural that the attention of many inventors was engaged in attempts to abrogate such defects. Houdin, Wilde, Callaud and others attempted to devise contrivances for the correction of this defect. But all that can be fairly

said about their arrangements is that they made the originally simple inventions more complicated and less sensitive in their action without attaining at all satisfactory results. Since the root of the evil is founded in the general principle of those electric dials, the evil could only be eradicated by the invention of an entirely new device, and such is the invention of my Electro-Magnetic Escapement.

It is free from the defects demonstrated above, and not only solved the problem completely, but certainly also in a very "simple and ingenious manner."

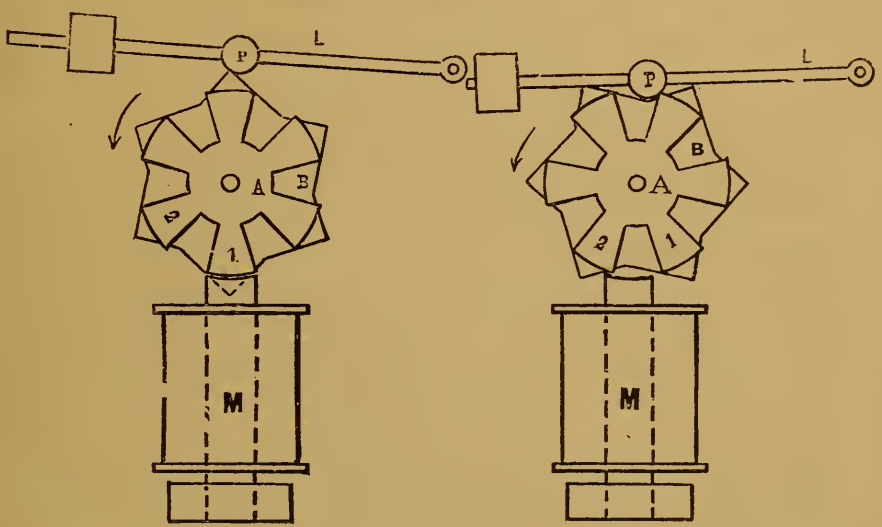

Fig. 2.
Circuit Closed.

Fig. 3.
Circuit Open.

Patented May 30th, 1882.

Figures 2 and 3 are a diagram showing the principle this invention involves.

A is an iron wheel divided into six equal segments, each segment representing an armature. B is the escapement wheel. It has inclined teeth, corresponding in number to the armatures of the wheel B. Both wheels are rigid to one shaft. L is a weighted lever, which presses by means of a little roller P into the teeth of the escapement wheel B. The electro-magnet M will attract the armature as soon as the electric current, passing through the coil, is closed. This armature will take its position right over the pole of magnet, as represented in Figure 2. When in this position

the lever L is raised, and presses the roller P against the upper part of a tooth of the escapement wheel B. As soon as the circuit is broken the weight of the lever will move both wheels in the direction indicated by the arrow, and put them into the position shown in Figure 3.

The armature 1 is now removed from the pole of the magnet, while the armature 2 has closely approached it. When the circuit is closed again, this armature will be attracted, and the roller P will raise the lever and pass over the apex of the next tooth of the escapement wheel, and there it will remain until the circuit is broken again, when the same action already described will be repeated. A spring may be substituted for the weight of the lever, which will allow this escapement to act in any position.

It will be seen, that by this arrangement not the slightest blow is imparted either to the armature or escapement wheel, for there is no impact; nor is the armature submitted to that objectionable, instantaneous check when arrived at its halting-place, for it will describe over the pole, before coming to a complete standstill, a few short but rather decided vibrations.

How remarkably silent in action clocks provided with an escapement can be made to go, was shown at the Electrical Exhibition in Philadelphia, where a seconds-beating clock with a large second hand was exhibited. No sound was perceptible, even when the ear was pressed against the frame containing the clockwork. One of the most noticeable points of this escapement is, that it utilizes the very power, which in other systems not only is wasted, but also produces their most objectional feature. I mean the power deposited in the armature when instantly checked. The pressing lever becomes the recipient of this power. While rising it prevents the armature from a too-rapid flight toward the magnetic pole, and has stored up sufficient power, when the roller has passed over the apex of a tooth, to move the armature at the breaking of the circuit twice the distance caused by the attracting magnet. A glance at the diagram will show, that the two sides of the teeth of the escapement wheel are differ-

ent in inclination, and therefore of uneven length. The shortest side, which occupies but one-third of the space given to each tooth, is the one that raises the lever, while the armature moves toward the pole, while the longer side, which occupies the remaining two-thirds of the space, is on the other hand moved by the lever. The distance of the latter movement is therefore just twice that caused by the magnetic force. That this movement is the result of power stored up in the lever, is self-evident. A rather convincing experiment, also shown at the Electrical Exhibition, demonstrated this view in the most practical way, by showing that one Laclanche cell may be sufficient to move three electric dials.

Not less noteworthy is the promptness with which this escapement responds to the action of the electric current. An official test made at the Electrical Exhibition, showed that the closing of the battery for but one-tenth of a second, was fully sufficient for a secure action.

In Figures 4 and 5 we see a complete mechanism of my Time Telegraph in its latest form. It represents one of those that are actuated but once every minute. Most of its parts will be understood without explanation. The magnetic poles are placed in a position directly opposite to each other, and the armature wheel between. The advantage of this is easily understood. The armature wheel will be attracted in two directly opposite directions, and relieve its bearings of all pressure or wear. It will permit the armature wheel to come into close proximity to the magnetic poles, without having eventually to fear an actual contact. The distance, therefore, need not exceed that of the thickness of strong paper, which assures a very effective disposition of the magnetic force. The pressing lever, bearing against the escapement wheel from below, relieves its journals of a great portion of its own weight, and makes the wearing tendencies practically harmless. *The wear on this mechanism must necessarily be so slight that even traces of it may not become perceptible for many years.* The manner this clock may be set is rather peculiar. Although rigid to the shaft of the minute wheel, the

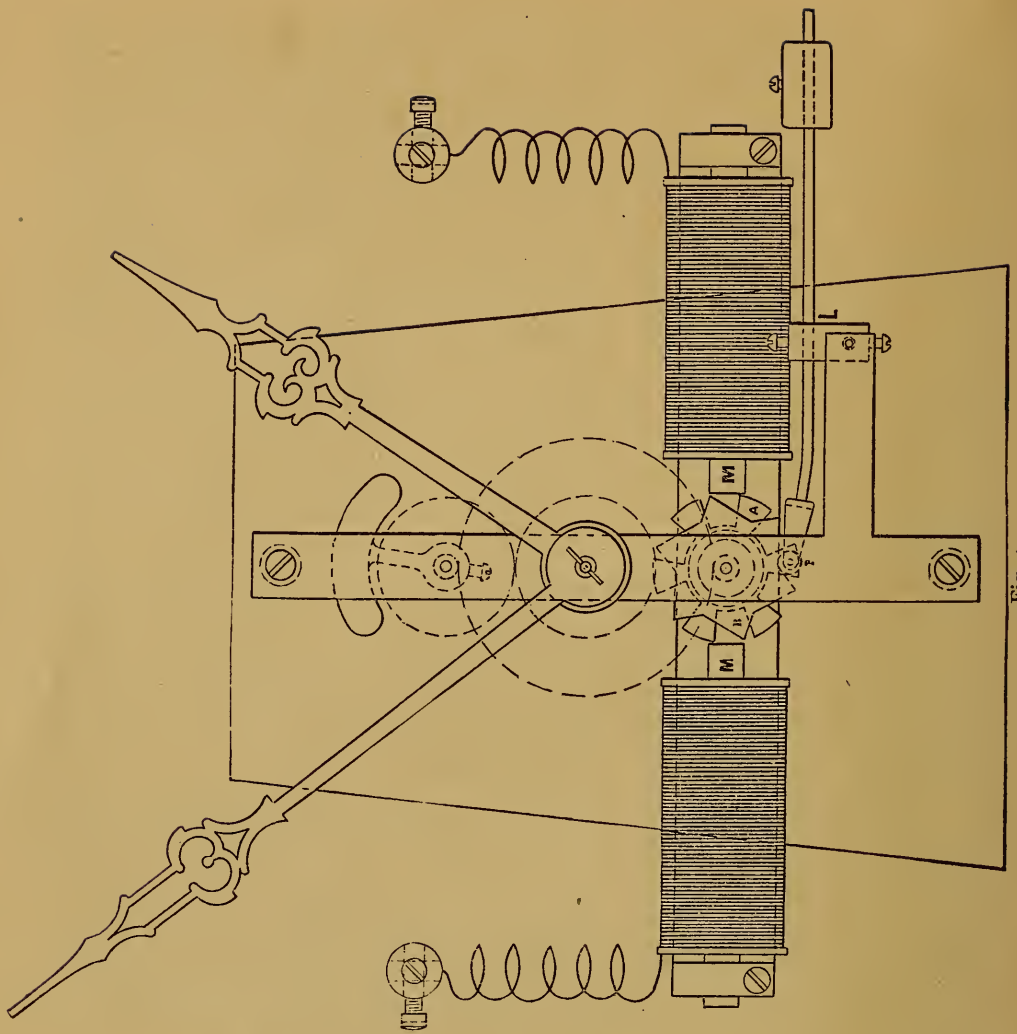

Fig. 4.

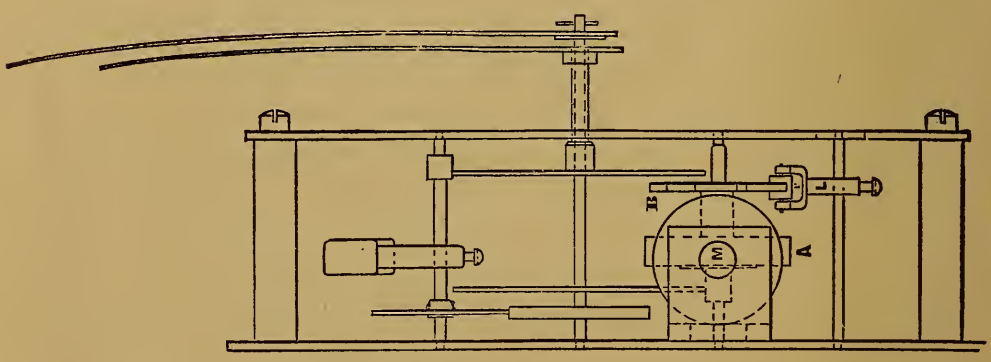

Fig. 5.

minute hand can be moved back or forward without injury to the mechanism. The hand will simply move the entire clock train either one way or the other, whereby the pulley will, in a cam-like action, glide up and down the teeth of the escapement wheel. By a simple device, means can be

provided for turning the clock hands without presenting any obstruction to the movement of the escapement wheel, when the clock is set in the described manner. All that is needed is to lift the roller out of the teeth of the escapement wheel. Seconds-beating clocks of this kind are always set best by the second hand, also either back or forward. The latter rather curious looking procedure was frequently performed by me at the Philadelphia Electrical Exhibition. I would deal a blow with a finger to the second hand (to the spec tators seemingly not very gentle), which would send it whirling round in the opposite direction of its designed course, until, mostly under the influence of the electro-magnet, it came to a stop, to follow again the direction of its natural course.

Since the sudden check of the armature is obviated, the hands may be fastened to their respective wheels with sockets, as is the custom in ordinary clocks. The impetus given to the hands in other electric clocks makes them slide on their bearings, unless they are rigidly fastened to the wheels that carry them. Even the second hands in my clocks are fastened to the pivot of the escapement wheel by an ordinary socket, so that it can be put on or taken off with the same ease as can be done on any ordinary clock.

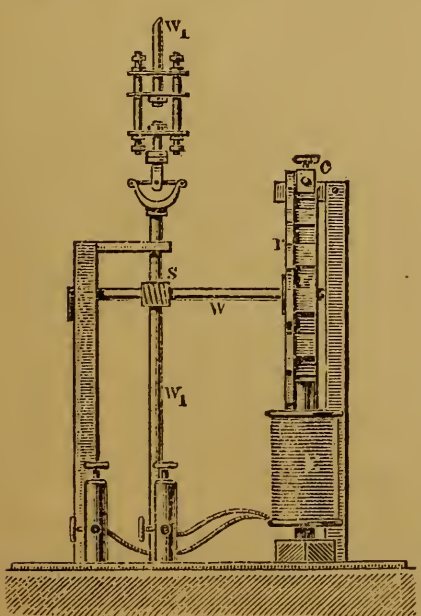

Fig. 6.

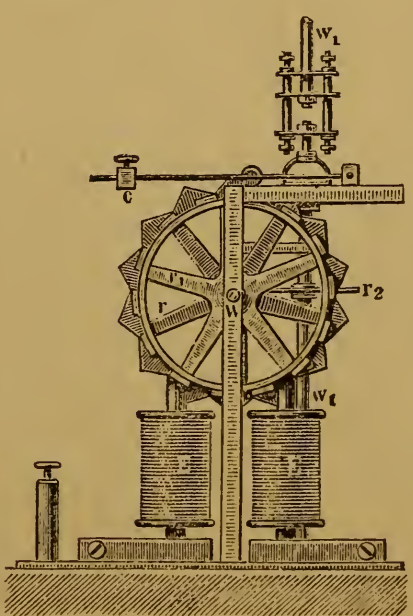

Fig. 7.

Figures 6 and 7 show the application of my electro-magnetic escapement for public clocks. Both the armature wheel r 1 and escapement wheel r are rigidly fastened to the shaft W. The latter is provided with the screw S. A wheel r 2 is fastened to the upright shaft W 1, and forms with S an endless screw. It is easily seen that the shaft W 1 will be turned by the endless screw when the electro-magnetic escapement is actuated by a successive making and breaking of the current. The shaft W 1 connects with a dial-work of a clock to move the hands of a clock dial.

The work this instrument does, compared to its size, is quite surprising. The diameter of the iron core of the electro-magnet is but 5-16 of an inch, and that of the armature wheel r 1 only $3\frac{1}{4}$ inches, and yet it develops sufficient power with two Callaud cells to drive the clock-work of four dials of 27 inches in diameter. This certainly seems to be a very favorable result, and may at no very distant time prove of great value, as it shows that a good regulator, removed from the influences of the changes of the weather, can control the dial works of a large public clock through the electric current furnished by a comparatively small battery.

That my electro-magnetic escapement is an invention peculiarly adapted for Time Telegraphs has become the undivided opinion of all who had occasion to see it in operation. Unique and simple as it is, it solves problems that proved to be perplexing in the construction of Time Telegraphs, and doubtless meets a want long felt. It possesses qualities not found in other instruments designed for the same purpose, a fact which was recognized by the Committee on Science and Art of the Franklin Institute when it bestowed the already-mentioned award upon me.

We now will turn our attention to a matter which at first sight would seem to be the easiest of all operations in Time Telegraphy, while in fact it has proven to be its weakest point. It is the contact-maker for the electric circuit which has in many iustances caused the condemnation of secondary electric clocks, whose skillful execution and superior con-

struction should have entitled them to a more deserving consideration. The obstacles that make the transmission of the electrical energy to the secondary electric dials difficult or uncertain are mainly the effect of the spark of the induced current at the contact terminals of the contact-maker, and the mode of operating the contact-maker by the main clock, without overtaxing its delicate mechanism for more power than is necessary for executing its ordinary functions.

It is a well-known fact, that by the induced current, excited in the coil of an electro-magnet, at the moment a galvanic current, that is passing through the coil, is broken, a spark is produced where the break of the circuit occurred. This spark it is, that has been really the most troublesome annoyance in Time Telegraphy. It either oxidized or even completely destroyed the contact surfaces of the circuit-breaker, and in either case there results a failure of closing the circuit of the voltaic battery and the stoppage of the secondary clocks. The means resorted to, to avoid this spark are various. Prof. Arzberger was the first who tried to close the end wires of the coil of the electro-magnet with a high resistance shunt, while others proposed a gradual interposition of a high resistance into the main circuit just before breaking it, to weaken the electric current and thereby reduce its galvanic induction to a minimum. But while such methods will have the tendency to weaken and thereby diminish the spark of the induced current, it is also obvious, that the spark will not be avoided entirely; a fact which experience has fully demonstrated. The method of short-circuiting the voltaic battery just before the breaking takes place of the same in the main line and to keep this short circuit until the break in the main line is made, is the only reliable way to attain the desired result. The manner in which my invention executes this operation is shown in a general way in Fig. 6.

We will, for a brief explanation of the process, give a translation of a description published in "La Lumiere Electrique," of Paris. (No. 16, 1883.)

"Mr. Spellier has just constructed an arrangement for a current-breaker intended for electric clocks.

"The annexed figure represents his device. E is the electro-magnet of an electric clock. H is a metallic wheel designed to produce the closings and breakings of the current. One of the poles of the battery is connected by the wire C with the spring L, which rubs constantly upon the axis d of the wheel. The other pole of the battery comes from the electro-magnet E, and is connected with a second spring R, which comes in contact with the three metallic pins p.

"When such contact is produced, the current is closed, and E can attract its armature.

"What is now necessary is to avoid the spark produced by the extra current, since it will occasion a defective contact of the current-breaker. For this purpose, a second spring S, is placed a little above R, and is connected by the wire D with the returning conductor.

"After one of the pins p has raised R, it comes in contact with S also, and then at the same time raises both springs. At this moment the current passes through the short circuit S D, and the electro-magnet E receives, on account of its resistance, only a weak portion of the same. Since both springs are now for a moment in contact with p, the extra current takes its way through C, D, S, R, E.

"*Here we have a device which can be advantageously employed in a certain number of instruments working by interrupted currents. By this arrangement will be avoided at the same time the variations produced by the extra current in the parts of the electric apparatus and also the destruction of the contact surfaces produced by the spark of the extra current.*"

It is hardly necessary to add to this description, that the contact between the short circuit S and P must continue until the main circuit established between R and P is broken, to prevent the electric current from again entering the main line, before the short circuit is broken.

Fig. 8 shows, of course the invention in its general principle; we shall presently show this arrangement as especially adapted for a contact-maker to actuate electric clock dials; while doing so, we will at the same time make ourselves acquainted with my method of making directly by the escapement wheel or its arbor, a firm electrical contact.

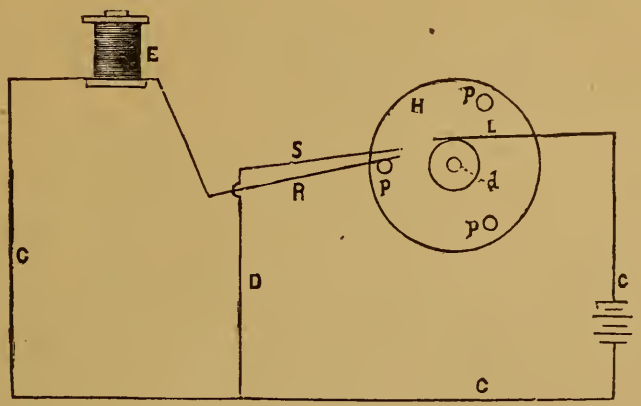

Fig. 8.
Patented July 21, 1885.

Heretofore the escapement wheel of any clock, when used for the making and breaking of an electric circuit to actuate secondary electric dials, did not exercise any more force at the moment of this making and breaking of the circuit occurred, than it did while serving its real purpose, namely, to give to the oscillating pendulum of the clock the impulses needed for the continuation of its movements.

The power necessary for these impulses, is very slight, and cannot be executed sufficiently energetically to make a reliable contact for the passage of the electric current. But since such a contact must be a firm one to make it secure, a frequent failure of making a complete electric circuit is not an uncommon consequence. This result also has greatly interfered with the reliability of secondary electric clocks.

To remedy this evil mainly two methods have been employed. One method is the use of a relay. In that case the escapement wheel of the regulator makes a very faint contact, sufficient for the passage of a weak electric current to operate the relay. This relay then

closes the main battery of an electric current sufficiently strong to actuate the electric dials in the circuit. The other method, which was first executed by Paul Garnier, of Paris, and which, especially on extended lines, has found a more general adoption in Europe, is based upon the use of an extra clock-work, which is set in action and arrested again at fixed intervals by the main clock. This extra clock-work operates the contact-maker of the electric circuit for the secondary dials, and is provided with ample power to effect a secure contact.

If properly constructed and executed, this method has proved to be a very reliable one. Its main objection rests in the fact that it is rather complicated in construction, and too costly to be purchased where but a few electric dials are desired, and above all, an attendant of but little skill cannot be entrusted with the maintenance or repair of such an arrangement. This is a fact which may justly receive full consideration in many places where an experienced mechanician

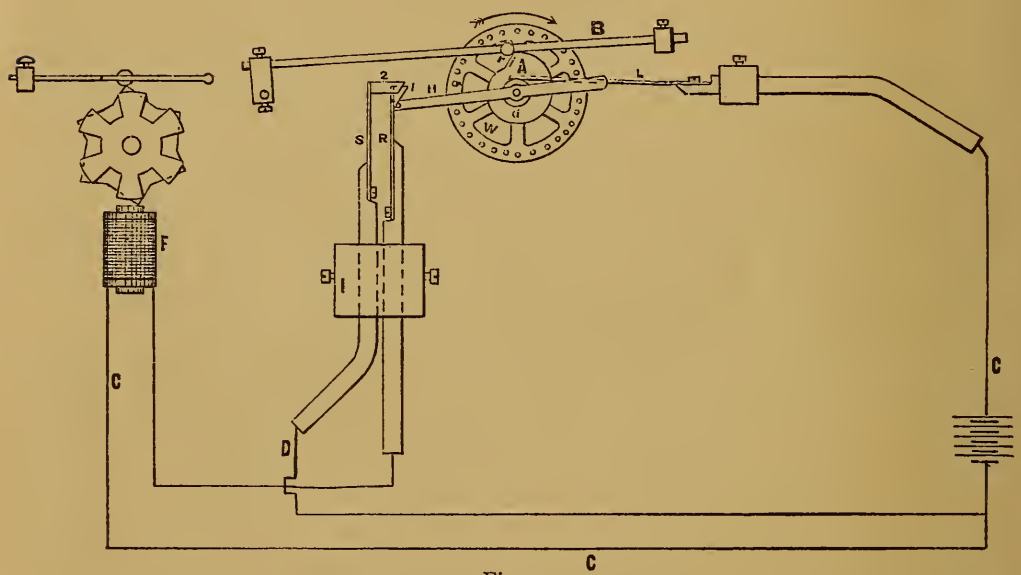

Fig. 9.

Patented November 17, 1885.

is not an hand. To meet this emergency is the object of the device shown in the diagram. It is intended to enable us to use in a simple and yet effective manner the escapement wheel, or its shaft, of the standard clock directly

for the making of a firm electrical contact. But since, as stated, under ordinary circumstances the escapement wheel has not sufficient force to accomplish this work, I have endeavored to invent a mechanism by which the escapement wheel, during the time the electric contact is made, receives an additional amount of power for the operation of the contact-maker. The reader will have no difficulty to recognize in this contact-maker the same principle that characterizes the "Sparkless Circuit-Breaker" already described. Parts of the same functions are marked with the same letters.

Figure 9 shows the arrangement. Its action will be readily understood.

The escapement wheel W moves in the direction of the arrow. Besides the contact arm H its shaft carries, also rigidly fastened to it, the cam A. The pin of the arm H is now in contact with the projection of the spring S, for the purpose of completing the electric circuit. At this time an increase of the power exercised by the escapement wheel is needed, to overcome the obstruction offered by the tension of the contact springs. To arrive at this result is the purpose of the cam A and the weighted lever B, which is pressing against the curve of the cam by a little roller r. It will be observed that just now the roller of the lever presses against the incline i of the cam. Thereby it imparts additional power to the shaft of the escapement wheel by its pressure, and assists to overcome the obstruction offered by the contact springs. The moment the contact pin has passed the projections of both contact springs, the roller r of the weighted lever reaches the lower part of the cam. It is gradually raised again as the escapement wheel revolves, and will repeat the same operation at the next contact between the pin of the contact arm and the projections of the springs. It is hardly necessary to mention that the whole mode of operation is but a gradual storing-up of a portion of the power expended by the escapement wheel during the course of its revolution, which is returned to the same at the proper moment for the purpose demonstrated.

It is obvious that the relative conditions between the weight of the lever L and the tension of the contact springs can be easily so adjusted that when the shaft of the escapement wheel is impelled with increased force this increase is exactly absorbed by the tension of the contact springs, leaving for the functions of the escapement wheel only so much force as properly belongs to it.

All regulators that were provided with this contact-maker needed but a slight additional weight (in some instances even this was not needed). In no case were the time-keeping qualities affected to any perceptible degree.

In conclusion, I may mention that the diagram also shows the three principal features of my system of Time Telegraphy systematically connected.

Abstract from the Report of the Committee on Science and Art of the Franklin Institute.

"*The principal object we think worthy of special commendation*, is this very ingenious escapement, which entirely avoids any sudden jar (for there is no impact), and works smoothly, and noiselessly, and practically, with the least possible friction.

"*Believing that the time is not far distant when it will be necessary to transmit time from a standard clock to different points in a large city, or in hotels, factories and dwelling houses, there are no means by which it can be done as cheaply, quickly and accurately as by Electricity, and there is no device that promises to do it so well, that we have yet seen, as* SPELLIER'S ELECTRO-MAGNETIC TIME TELEGRAPH. *As we think Spellier's invention such a great step in advance that it merits the* WARM APPROVAL AND COMMENDATION OF THE FRANKLIN INSTITUTE, WE RECOMMEND THAT HE BE AWARDED THE ELLIOT CRESSON GOLD MEDAL."

The above report was unanimously adopted at the second reading by the Committee on Science and the Arts, and, on their recommendation, the Board of Managers awarded the medal.

The Elliott Cresson Gold Medal was intrusted, by the provisions of Elliott Cresson's will, to the Franklin Institute, in the year 1848. Since its foundation, this is the eighth medal awarded.

PHILADELPHIA, October 23, 1885.

TO THE BOARD OF MANAGERS:

Novelties Exhibition of the Franklin Institute.

The undersigned, judges of class 16, b, have examined Exhibit No. 263, Louis H. Spellier.

The ten Electric Clocks in different parts of the Exhibition Building, are furnished with the Sparkless Current-Breaker, and are all worked from one clock.

A description of the clocks, with the improvements, will be found in the attached papers and drawings furnished by the exhibitor.

We would declare the exhibit of Electric Clocks as being worthy of the award of the Silver Medal, and each of the following details, embraced in these clocks, as being worthy of a Certificate of Honorable Mention:—

1. The Sparkless Current-breaker.
2. The Electric Pendulum.
3. The Power Accumulator.

And further, we would recommend to the consideration of the *Committee on "Science and the Arts,"* as being worthy the award of the *Scott's Legacy Premium*, the Electric Clock as a whole, embracing the aforesaid improvements, the Escapement of this clock having already received the award of the Elliott Cresson Gold Medal.

Respectfully,

GEORGE H. PERKINS,
Chairman.

JOSEPH ZENTMAYER,
GLANVILLE FAUGHT,
HENRY PEMBERTON.

The "Scott Legacy Medal and Premium," was intrusted in 1816, to the City of Philadelphia, by John Scott, Chemist, of Edinburgh, and is by that city awarded to inventors upon the recommendation of the Franklin Institute only.

The award consists of Twenty Dollars, with a medal bearing the inscription "To The Most Deserving."

From "Mechanics," New York, March 17, 1883.

"The Sparkless Current-Breaker by Mr. Spellier, which is illustrated in another column, will be found of great interest to those of our readers who had to build electrical machinery where a contact-breaker for an electrical current was necessary. The late Dr. Bradley's very elaborate and perfect system of electric clocks, though not impracticable, was, for the want of a contact-breaker, both difficult and expensive to keep in order, and we presume the uncertainty of the doctor's final device, the wire brush, was one of the greatest difficulties which he found in the way of its introduction."

Hall of the Franklin Institute, January 26, 1884.

Mr. Spellier, Philadelphia.

Dear Sir:—

I have so expressed my favorable opinion of your Electric Clocks and Time Telegraphs in my journal, the "Manufacturer and Builder" (December, 1882, April, 1883), that I cannot see that I can add anything to what I say in these articles. You are at liberty to make what use of them you may deem proper.

Yours truly,

WILLIAM H. WAHL,

Editor "Manufacturer and Builder."

Prof. Van der Weyde, President of the Electrical Society of New York, gave, after a careful study of this system at the Electrical Exhibition, the following testimonial:—

"I have given considerable attention to various kinds of Electric Clocks, and by practical experience have obtained knowledge of the special merits of many of them, and I feel bound to declare that I consider the peculiar mode of escapement of Mr. Spellier, and his system of closing and breaking the circuit, superior to that of other Electric Clocks I am acquainted with, and I am confident that the meritorious qualities of his clocks will soon be universally acknowledged."

International Exhibition Building, Philadelphia, October 11, 1884.

P. H. VAN DER WEYDE,
Member of the Board of Examiners.

From the "Electrical World," New York, September 27, 1884.

"Mr. Louis H. Spellier, of Philadelphia, has a space near the offices of the Exhibition management on the main floor, and a number of his clocks are distributed throughout the building. His system is highly ingenious, and although invented in this country, has certainly gained greater celebrity in Europe than it has here. Many of the standard European books on electrical appliances bestow warm praise on the Spellier system. We hope to bring, in a later issue, a detailed description of the Spellier system before our readers. In passing, we may note that two years ago it received from the Committee on Science and Arts of the Franklin Institute, the Elliot Cresson gold medal, an award given but eight times in thirty-two years. One great feature of the system is that it avoids the blows produced by the sudden check offered to the armature when closely approaching the pole of the electro-magnet. This is, however, but one of its merits. The movement exposed to full view and working a large clock dial, is almost the first thing to catch the eye on entering the Exhibition from the doors at the lower end, or by the bridge connecting with the annex."